Brownian Transport Through Modulated Potential Energy Landscapes

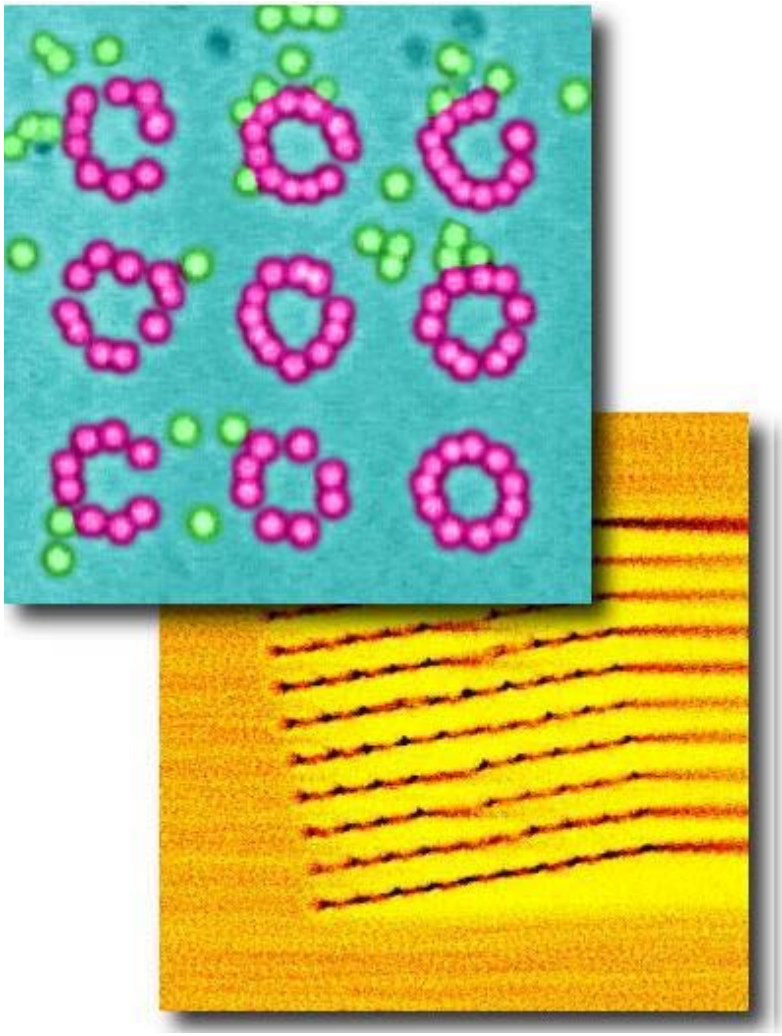
David G. Grier, University of Chicago, DMR-0304906

Transforming Mesoscopic Matter with Holgraphic Optical Tweezers

Computer-designed holograms project large three-dimensional arrays of optical traps, actuators and photochemical reactors.

Applications include

- Dynamically reconfigurable nanofluidic pumps and mixers, assembled and driven by light (top)
- Exponentially selective fractionation of mesoscopic materials including proteins, nanoclusters, and biological cells (bottom)
- Automated all-optical fabrication of sensors and photonic devices



D. G. Grier, *Nature* **424**, 810-816 (2003)

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Industrial Outreach (2003)

US006055106A

United States Patent [19]
Grier et al.

[11] Patent Number: 6,055,106
[45] Date of Patent: Apr. 25, 2000

[54] APPARATUS FOR APPLYING OPTICAL GRADIENT FORCES

5,689,109 11/1997 Schutze 250/251
5,776,674 7/1998 Ulmer 435/6

US006416190B1

(12) **United States Patent**
Grier et al.

(10) Patent No.: US 6,416,190 B1
(45) Date of Patent: Jul. 9, 2002

US006624940B1

(12) **United States Patent**
Grier et al.

(10) Patent No.: US 6,624,940 B1
(45) Date of Patent: *Sep. 23, 2003

US006626546B2

United States Patent
ier et al.

(10) Patent No.: US 6,626,546 B2
(45) Date of Patent: Sep. 30, 2003

R&D 100

- 6 US Patents
- 10 US Applications
- 20 Foreign and PCT

- Company founded on project technology
- R&D 100 Award for technological innovation

Popular Outreach (2003)

- Coverage by BBC
- Story in BusinessWeek
- Scientific American 50 Award

Educational Outreach (2003)

2 postdocs trained; 3 Ph.D.'s placed; 4 graduate students in training; 3 undergrads including 2 REU students prepared for graduate studies; 2 high school interns.